



PART #: NETB14WRXP

User Manual and Installation Guide

The WireRat®Express (Part # NETB14WRXP) is a stand-alone span cable theft alarm system.

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Revision History

Rev	Date	Description
A	May 8, 2015	Initial release of manual.

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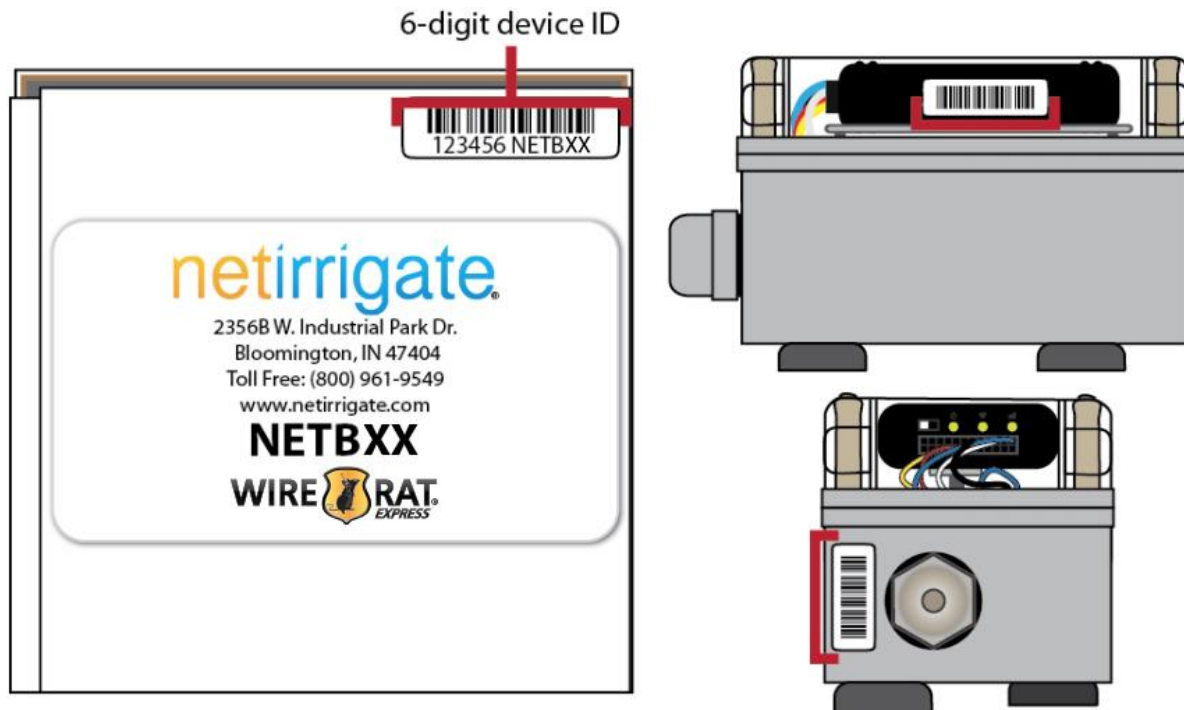
Applications

The WireRat® Express (Part # NETB14WRXP), is a copper wire theft alarm product that works seamlessly with all brands of pivots and requires *no external power*. The NETB14WRXP utilizes a patented supervisory circuit that works strictly on lithium battery power for 5 to 7 years. When a pivot's span cable is cut or tampered with, the NETB14WRXP sends instant text, voice, or email notifications that a possible theft is occurring.

Getting Started

Identifying the Device Id

All NETB14 products are uniquely identified by a 6 digit serial number which is barcoded on both the packaging carton and the physical unit. Net Irrigate refers to this number as the "Device Id".





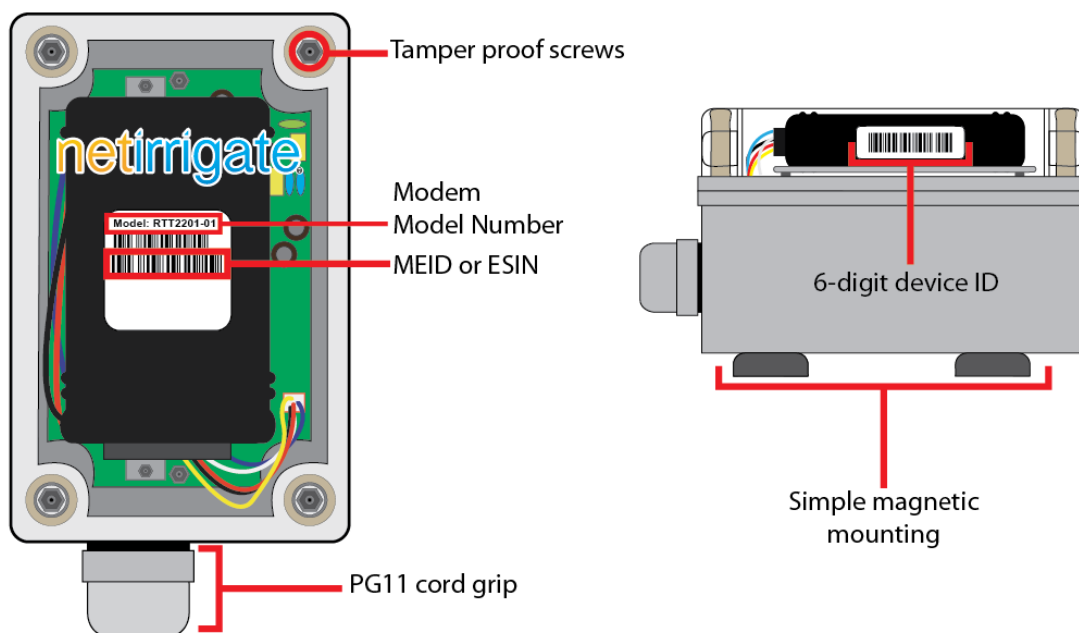
Package Contents

All NETB14WRXP units ship with:

1. A ½" NPT Cord Grip to be used with the knock out on the pivot's end tower box.
2. Magnetic mounts which come pre-installed on the enclosure.
3. A 24" clamp pipe ideal band for safety-securing the unit.
4. A wire nut which may need to be used if wiring the NETB14WRXP to keep the ground and neutral wires from touching before installation.
5. An extra *Device Id* bar code sticker which can be placed on the panel of the center pivot so the associated *Device Id* can be identified at the pivot pad.



NETB14WRXP Overview



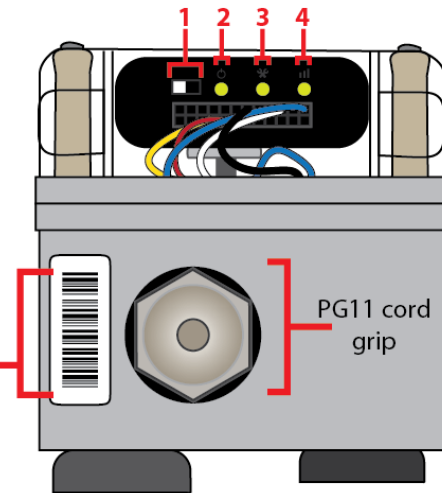
1. Internal battery switch- only applicable to devices with model #: RTT2201-00. If the model number ends in '-00' the switch should be to the left.

2. Power indicator light- will be solid when the device is powered up and has a cellular connection.

3. GPS indicator light- will be solid when GPS coordinates have been locked in. May take up to 5 minutes to initialize.

4. Cellular connection indicator light- will be solid when cellular connection is established. If it's flashing, then a connection has not yet been established.

6-digit device ID

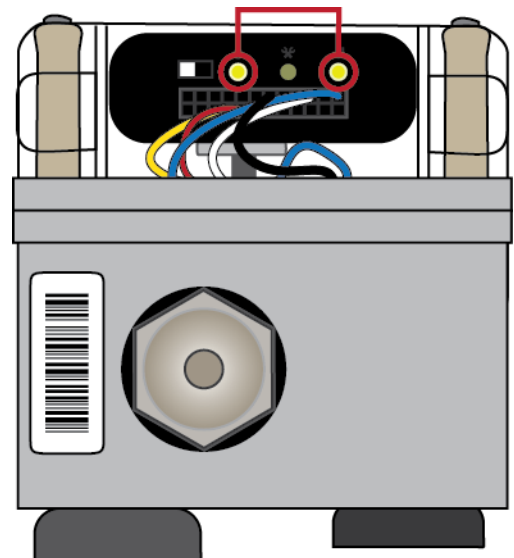


White	Neutral
Green	Ground

Bench Testing

Bench test the NETB14WRXP at your shop, and at the pivot before installation. A simple bench test ensures a properly functioning unit and adequate wireless coverage. Bench testing involves the following procedure:

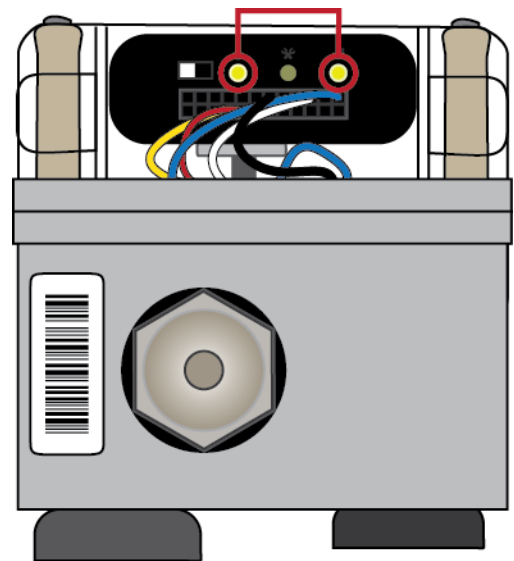
1. Identify the Device Id of the NETB14WRXP. Recall that the serial number is barcoded on unit next to the cord grip and also on the modem inside the clear cover.
2. Log into the NetIrrigate® iPhone or Android app or netirrigate.net and create the new site for the customer.
3. Set up you Phone list of contacts to be alerted of the different notifications.
4. Link the device to the new site, and *denote the site name on the device's cardboard box.*
5. Remove the wire nut from the green wire. Touch the green and white wires together, and hold for **10 seconds**. Separate the wires, and watch for the two outside lights on the modem to flash and then become solid.
6. Check the Event Log in the NetIrrigate® app or the Incoming Events on www.netirrigate.net for a code '103'.



- If you do not see an incoming '103' within 3 minutes, or do not have a computer, iPad, or iPhone available, please contact dealer support at (800) 961-9549 x3.

Text message Bench Test Method

- Identify the Device Id of the NETB14WRXP. Recall that the serial number is barcoded on the bottom of the unit to the right of the cord grip.
 - Use your cell phone to text the phrase "TEST XXXXXX" to **317-602-1732**. Where XXXXXX is the serial number of the unit. Example "**TEST 333001**".
 - You should receive a text message back from our server within 60 seconds that says: *"333001 is ready for bench testing. Hold White and GND wire together and then break bond. You will be notified in three minutes when test completes."*
 - Follow the instructions texted to you by holding the White and GND (green) wires together and then breaking the circuit. This action will initiate a diagnostic test on the unit and will text you when complete. The entire test should take about 3 minutes.
 - Within 3 minutes, you should receive the text message: *"Bench test successful. Device 333001 is functioning properly and registered on the NetIrrigate network."*
 - If you receive an error message from our server or do not receive a text message indicating success within 3 minutes, please contact dealer support at (800) 961-9549 x3.
- Remove the wire nut from the green wire. Touch the green and white wires together, and hold for **10 seconds**. Separate the wires, and watch for the two outside lights on the modem to flash and then become solid.
 - If you do not see the appropriate lights illuminate within 3 minutes, please contact customer support at (800) 961-9549 x 2.
 - DO WE WANT TO ADD THE TEXT MESSAGE METHOD HERE?



Customer and Site Setup

Before installing the NETB14WRXP on a pivot, it is best to setup the customer information, the irrigation site details, and the intended notification recipients in the NetIrrigate® system. Additionally, you will need to link this information to the *Device Id* you intend to mount. Setup is fast and easy and can be accomplished three simple ways:

- Login to the NetIrrigate® mobile app.** You may use the same login information as you would use to login to www.netirrigate.com. If you do not yet have a username and password for your dealership, please contact customer support at (800) 961-9549 or email help@netirrigate.com.



- a. Select the existing customer from your customer list, or click the **+** command icon in the top left corner to create a new customer. From that customer's page, select the command icon **+** again, and select Add Irrigation Site. Fill in the requested fields and tap Add Irrigation Site to save details.
2. **Login to www.netirrigate.com.** For details on how to utilize the dealer portal on www.netirrigate.com, click on the Support tab and review the document entitled "*Net Irrigate Software Guide for Dealers*".
3. If you do not have access to a computer or the NetIrrigate® mobile apps, just contact customer support at (800) 961-9549 and an agent will setup the customer, site, and notification recipients for you.

Functional Principles

How the WireRat®Express Works

The NETB14WRXP utilizes the cellular network to communicate with Net Irrigate's server. When Net Irrigate's server receives codes from the unit, it is able to translate the code into useful information and send the corresponding notifications.

Battery

The NETB14WRXP utilizes a custom designed lithium battery pack which is designed to operate the interval cellular radio modem for at least three years. Expected battery life could be as long as seven years depending on environmental conditions and frequency of pivot operation. A working battery is imperative for proper functionality. The battery can be tested by following the bench testing procedures on the previous page. Battery life reports are also available for dealers on the Net Irrigate software.

Span Cable Theft Detection

The NETB14WRXP checks for cut wire by sending a small supervisory current through the neutral and ground conductors of the pivot's span cable regardless of whether AC power is present or not. When this supervisory current is interrupted, an alarm code is triggered. The supervisory current is generated by the internal NETB14WRXP battery and works seamlessly with normal pivot operation.

WireRat® 4.0 technology will self-test, by simulating span cable cuts on a fixed periodic basis. This will ensure the alarm is not compromised and reduces the risk of becoming disarmed due to pivot maintenance and eliminates the need for physical testing.



Mounting and Wiring the NETB14WRXP

Ideally, the NETB14WRXP should be mounted on the end tower of a pivot. Mounting on the end tower provides for maximum protection against span cable theft.

1. **Ensure power to the pivot is completely off and the control panel is locked.**
2. Climb the tower of the pivot and allow the powerful magnets on the back of the NETB14WRXP to adhere to the angle iron of the pivot. The NETB14WRXP should be positioned vertically and above the junction box.
3. Remove the cover from the tower electrical box.
4. If the bottom of the tower box is not equipped with a standard ½" NPT knock-out, drill an appropriate hole to fit the black ½" NPT cord grip which is included in the NETB14WRXP packaging.
5. Install the supplied cord grip and lock nut.
6. Run the tray cable from the NETB14WRXP through the cord grip and into the tower box.
7. Follow the appropriate wiring diagram found in the appendices. If installing on a pivot brand not listed, please contact customer support at (800) 961-9549.
8. Once the NETB14WRXP wires are connected to the appropriate terminals, replace the cover on the tower box.
9. If necessary, zip-tie the NETB14WRXP tray cable away from the mechanical levels beneath the tower electrical box to avoid kinks or obstructions.
10. Wrap the included 24" ideal band around the NETB14WRXP unit for added security. While the mounting magnets are extremely strong, the ideal band is designed to protect against extremely severe weather.
11. Proceed to the testing procedure on the following page.



Testing Procedures

Setting up Notification Recipients

In order to successfully test span cable alerts, one or more phone numbers must be associated with the respective alert on our website. You may easily set up notification recipients on the NetIrrigate® mobile apps or our website. For detailed instructions on the adding a notification recipient via the NetIrrigate® mobile apps, visit our support site at help.netirrigate.com.

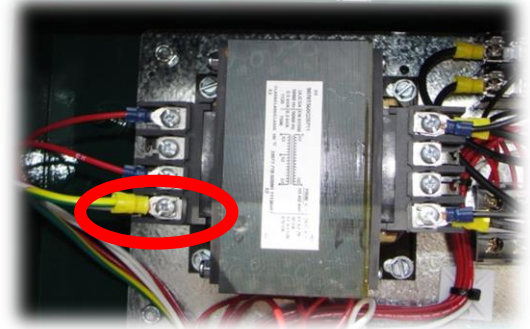
Testing the device is VERY IMPORTANT. Installation should not be done without testing the wiring.

Simulating Span Cable Cuts

Before testing the cut wire alarm, at least one notification recipient should be configured for the site in question. If this has not been done, please see previous section Customer and Site Setup. Once it is determined that a notification has been configured for a span cable cut event, follow the procedure below:

Primary Method

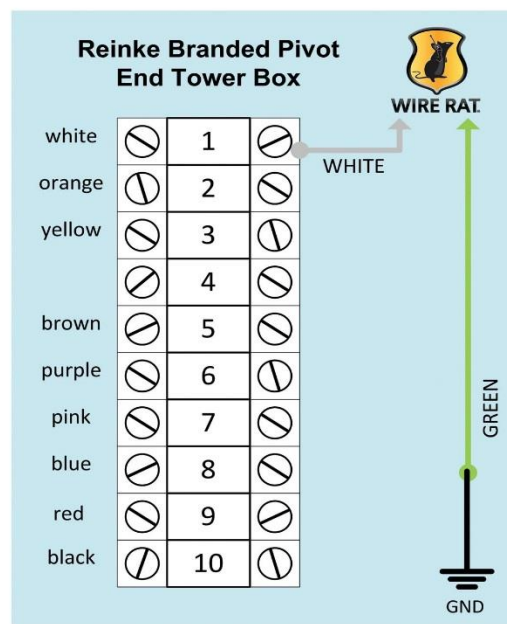
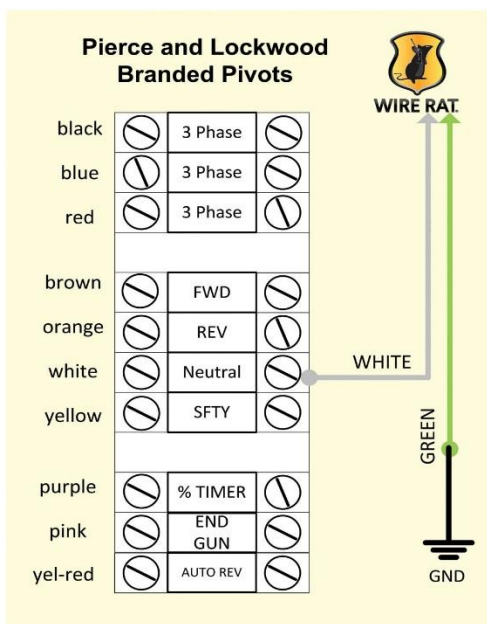
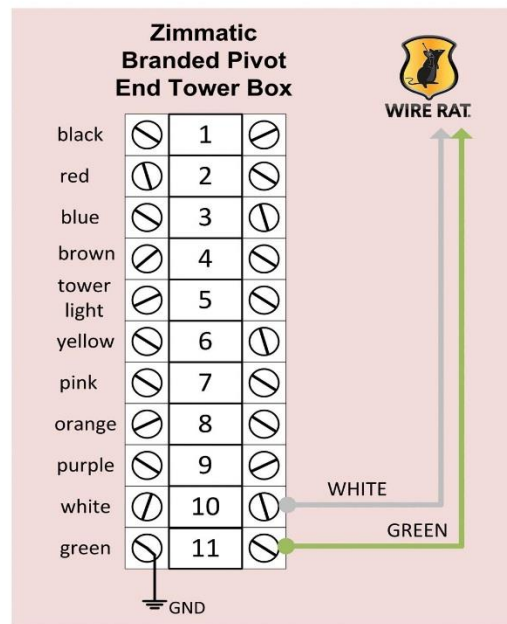
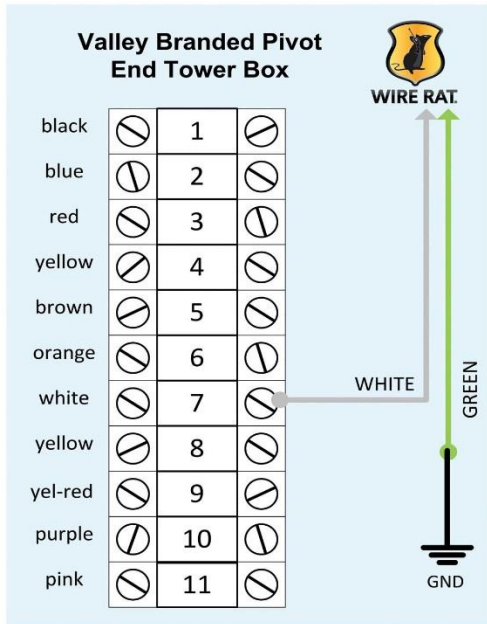
1. Go to the main panel at the pad and **ensure the power to the panel is completely off**.
2. Open both panel doors such that the control transformer within the pivot panel can be accessed.
3. If the pivot panel is equipped with a relay board, disconnect the clip to the relay board which may contain a neutral and ground conductor.
 - 3.1 Check to see if there are pump control wires installed to the span cable terminal strip to the main panel. If they are on the neutral, remove them.
4. Locate X-2 on the control transformer. This is where the white and green wires are bonded.
5. Remove the terminal screw and separate the white wire and the ground wire for at least 30 seconds.
6. Replace the wires and be sure to re-tighten the terminal screw.
7. Wait at least 3 minutes for a text, voice, or email alert which indicates a possible theft is occurring. If an alert is not received, try testing with the alternative method on the following page.



Alternative Method

1. **Ensure power to the pivot is off and the control panel is locked.**
2. Walk to the first drive tower, climb it, and remove the tower box cover.
3. Note the terminal numbers of where each wire is connected. There are two gauges of wire in the tower box. The smaller wire is what you will be working with. The span cable heading out toward the end tower is what will need to be disconnected sequentially.
4. Remove each 120VAC control circuit wire. This includes: safety, forward, reverse, percent timer, and end gun. **REMOVE THE WHITE NEUTRAL CONDUCTOR LAST.** Ensure that the bare ends of the unhooked wires are not touching anything.
5. Wait at least 30 seconds and replace the wires to their respective terminals.
6. Replace the tower box cover.
7. Wait at least 3 minutes for a text, voice, or email alert which indicates a possible theft is occurring. If an alert is not received please contact customer support at (800) 961-9549.

Appendix A – Wiring Diagrams



Appendix B – Troubleshooting Span Cable Theft Alarms

PROBLEM: ALARM DOES NOT TRIGGER

If the span cable alarm does not trigger, it must be determined if the problem exists within the pivot or the NETB14WRXP. The simplest way to determine if the NETB14WRXP is functioning properly is to perform a bench test on the unit. If the NETB14WRXP has already been installed, do the following:

1. Remove the NETB14WRXP white wire from the tower box terminal strip. A red led light within the NETB14WRXP enclosure should illuminate. If the red led light is lit, the problem is within the pivot. If it is not, proceed to #2.
2. Remove the NETB14WRXP green wire from the tower box terminal strip or grounding bar. Hold the green wire tightly to the NETB14WRXP white wire for 10 seconds and release. The red led light within the NETB14WRXP enclosure should illuminate and the issue clearly lies within the pivot wiring. If the red LED light *does not* illuminate, the NETB14WRXP is defective. Please call (800) 961-9549 for RMA procedures.
3. Successful operation of the span cable alarm requires at least 20,000 ohms of resistance between the neutral and ground conductors of the pivot. Locate the control transformer in the pivot control panel. Remove the bonding wire (green) from terminal X2 on the control transformer. Re-tighten the terminal screw to hold the remaining neutral wires (white) in place on X2.
4. If the pivot is equipped with a modern relay board, disconnect the clip to the relay board that contains ground and neutral conductors.
5. Using an **analog ohmmeter**, measure the resistance between the bonding wire (green) and terminal X2 (white) on the control transformer. The measured resistance should be greater than 20k (20,000) ohms. If the measured resistance is less than 20k ohms see Appendix C entitled “Common Causes of Low Ground Resistance”.

NOTE: We strongly recommend using an analog ohm meter with a 10K ohm scale (such as the Simpson meter pictured) to measure ground resistance. In our tests, digital meters often provide erroneous results in measuring ground resistance which may exceed 10,000 ohms.





PROBLEM: FALSE ALARMS

False alarms may be triggered when the circuit resistance between the span cable neutral conductor (white) and the span cable ground conductor (green) rapidly increases to more than 50K ohms. Large changes in circuit resistance CAN be tolerated without triggering the alarm. For example:

- Abrupt changes in circuit resistance from near 0 ohms to 20K ohms *will not* trigger the alarm. The circuit resistance can repeatedly be changed from 0 ohms to 20K ohms without triggering the alarm.
- Gradual changes in circuit resistance from near 0 ohms to 50K ohms *will not* trigger the alarm and disarm it, since there is not a circuit to protect.

Symptom	Probable Cause and Remedy
<i>False alarms randomly occur when pivot is sitting idle</i>	• Dirty collector ring (most common on Zimmatic pivots). Clean collector ring with emery cloth. • Corroded rotary brush assembly at collector ring. Install a 2000 ohm 5 watt resistor between the neutral conductor and ground conductor across the outbound span cables at the collector ring. • Loose connection on ground or neutral terminals in tower boxes. This may occur due to deteriorating span cable cord grips on tower boxes. Rerterminate every neutral in the span cable.
<i>False alarms occur on pivot start-up only</i>	• Barricade stop is holding safety circuit open longer than expected, thus NETB14WRXP cannot see AC Line signal until pivot moves completely off the barricade. Rewire to junction box before barricade stop switch. • Barricade stop switch is opening neutral conductor. • Transient voltage spikes from generator. Leave pivot panel in the OFF position while starting up generator.
<i>False alarms when pivot stops</i>	• Loose neutral or ground on pivot. • NETB14WRXP box not securely mounted and rattling.

Appendix C – Common Causes of Low Ground Resistance

Three different types of digital multi-meters were field tested for measuring span cable resistance. All three digital meters gave erroneous readings. We assume that the capacitance between the span cable shield and the span cable conductors produce unreliable digital meter readings. An analog meter with 10K scale is required. The WireRat™ span cable alarm will function if the 'open' circuit resistance is 20,000 ohms or higher. If the 'open' circuit resistance



is lower than 20K ohms locating the source of the grounds can be both difficult and time consuming. Some of the most likely causes of low ground resistance measurements are as follows:

I. Running Lights

- a. Flexible cords to the running lights are cracked and water logged.
- b. Running light lamp sockets are deteriorated and leak to ground.

II. Collector Rings

- a. Corrosion and debris on brush holders.
- b. Corrosion and deterioration on shaft assembly.

III. Causes Specific to Valley Branded Pivots

a. Tower Boxes

- i. The neutral wire that supplies the relay coil circuit chaffs on the sharp edge of the relay back plate. Newer tower boxes have a nylon cable strap to prevent chaffing.
- ii. Moisture, corrosion and debris build up on the terminals of the micro-switches mounted to the bottom plate of the tower box.

b. Neutrals - *although the alarm connects to the neutral wire (white) of the span cable, most of the other conductors in the cable become part of the supervisory circuit.*

- i. At each intermediate tower box the neutral (white) is connected to the forward and reverse conductors (brown, orange) through each motor contactor relay coil and micro-switch (600 ohms).
- ii. The de-watering timer at the second to last tower connects the neutral wire (white) to the safety out (yellow-red), and safety return (yellow) through the timer clock motor (1200 ohms).
- iii. The percent timer (purple) is connected to the neutral through the relay coil in the end tower (600 ohms).
- iv. The end gun circuit (pink) is connected to the neutral through the solenoid coils.

c. Corner Arms - depending on methodology at install time, certain Valley branded corner arm pivots may require an isolation relay in the end tower to disconnect the neutral conductor from the corner arm when the pivot is off. The relay coil can be supplied by safety out (yellow-red). If an isolation relay is not used the span cable to the corner arm will not be protected by the span cable alarm. The whole pivot will not be protected, because there is a neutral ground bond at both ends of the pivot.

IV. Reinke Pivots

- a. Some newer Reinke Pivots use a switch at the pad to turn on and off the end gun. When the end gun is off, Neutral is grounded out. The alarm will work up to the switch.

